

PATENT

Attorney Docket No. 13DV-13434

Ser. No. 09/477,422

21619.000091

Page 2

AMENDMENTS**I. Claim Amendments**

Please amend the claims as set forth below. This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-7. (canceled)

Claim 8. (currently amended) A method for preparing an article having a platinum-aluminide surface region, comprising the steps of:

providing a substrate having a nickel-base superalloy substrate bulk composition and a substrate surface;

depositing a layer of platinum upon the substrate surface, thereafter;

diffusing a platinum from the layer of platinum into the substrate surface, thereafter;

providing a source of aluminum; and thereafter

diffusing aluminum from the source of aluminum into the substrate surface for a time sufficient to produce a substantially single phase surface region at the substrate surface, the surface region having an integrated aluminum content of from about 18 to about 28 percent by weight and an integrated platinum content of from about 18 to about 45 percent by weight, balance components of the substrate bulk composition, wherein the surface region comprises a surface, distant from the substrate surface, and which surface region includes aluminum content and platinum content which is relatively high adjacent

## PATENT

Attorney Docket No. 13DV-13434

Ser. No. 09/477,422

21619.000091

Page 3

to the surface and decreases with increasing depth into the surface region and the substrate.

Claim 9. (previously presented) The method of claim 8, including an additional step, after the step of diffusing aluminum, of depositing a ceramic layer overlying the substrate surface.

Claim 10. (previously presented) The method of claim 8, including an additional step, after the step of diffusing aluminum, of annealing the substrate and the surface region.

Claim 11. (previously presented) The method of claim 8, wherein the step of diffusing aluminum includes the step of

diffusing aluminum from the source of aluminum into the substrate surface for a time sufficient that the surface region has an integrated aluminum content of from about 21 to about 23 percent by weight and an integrated platinum content of from about 30 to about 45 percent by weight, balance components of the substrate bulk composition.

Claim 12. (previously presented) The method of claim 8, wherein the step of providing a substrate includes the step of

providing a nickel-base superalloy substrate which is substantially a single crystal and has a composition that includes from about 5 to about 16 weight percent aluminum and from about 1 to about 8 weight percent rhenium.

## PATENT

Attorney Docket No. 13DV-13434

Ser. No. 09/477,422

21619.000091

Page 4

Claim 13. (previously presented) The method of claim 8, wherein the step of providing a substrate includes the step of

providing a nickel-base superalloy substrate which has a composition selected from the group consisting of (a) 7.5 percent cobalt, 7 percent chromium, 6.2 percent aluminum, 6.5 percent tantalum, 5 percent tungsten, 1.5 percent molybdenum, 3 percent rhenium, balance nickel; (b) 12.5 percent cobalt, 4.5 percent chromium, 6 percent aluminum, 7.5 percent tantalum, 5.8 percent tungsten, 1.1 percent molybdenum, 5.4 percent rhenium, 0.15 percent hafnium, balance nickel; and (c) 12 percent cobalt, 6.8 percent chromium, 6.2 percent aluminum, 6.4 percent tantalum, 4.9 percent tungsten, 1.5 percent molybdenum, 2.8 percent rhenium, 1.5 percent hafnium, balance nickel.

Claims 14-15. (canceled)

Claim 16. (previously presented) A method for preparing an article having a platinum-aluminide surface region, comprising the steps of:

providing a substrate having a nickel-base superalloy substrate bulk composition and a substrate surface, thereafter;

depositing a layer of platinum about 0.0003 inches thick upon the substrate surface, thereafter;

heating the substrate and layer of platinum to a temperature of about 1800-2000°F for a time of about 2 hours, thereafter;

## PATENT

Attorney Docket No. 13DV-13434

Ser. No. 09/477,422

21619.000091

Page 5

providing a source of aluminum in contact with the substrate surface, the source of aluminum having an activity of about 40 to about 50 atomic percent as measured in a pure nickel foil; and simultaneously

heating the substrate surface and the source of aluminum to a temperature of about 1925-2050°F for a time of from about 4 to about 16 hours to form a substantially single phase surface region.

Claim 17. (previously presented) The method of claim 16, including an additional step, after the step of heating the substrate surface and source of aluminum, of depositing a ceramic layer overlying the substrate surface.

Claim 18. (previously presented) The method of claim 16, wherein the step of providing a substrate includes the step of

providing a nickel-base superalloy substrate which is substantially a single crystal and has a composition that includes from about 5 to about 16 weight percent aluminum and from about 1 to about 8 weight percent rhenium.

Claims 19-72. (canceled)

Claim 73. (previously presented) A method of forming a thermal barrier coating on a substrate, comprising:

chemical vapor depositing a substantially single phase diffusion aluminide layer on the substrate which includes a nickel base superalloy substrate, said aluminide layer including an average aluminum concentration in the range of about 18 to about 28 % by weight and an average platinum concentration in the range of about 8 to about 45 % by

## PATENT

Attorney Docket No. 13DV-13434

Ser. No. 09/477,422

21619.000091

Page 6

weight, wherein said aluminide layer further comprises a surface, and includes the aluminum content and the platinum content which is relatively high adjacent to the surface and decreases with increasing depth into the aluminide layer and the substrate; and

depositing a ceramic thermal barrier layer on the aluminide layer.

Claims 74 – 111. (canceled)

Claim 112. (previously presented) The method of claim 73 wherein the aluminide layer comprises an average platinum concentration of about 18 to about 45 % by weight.